

Intrarenal pressure: must be monitored in Endourology



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6 years ago...

I need a more
powerful
assistant

SILVIA WASH!
IF YOU DO NOT SEE,
I DO NOT SEE AS WELL





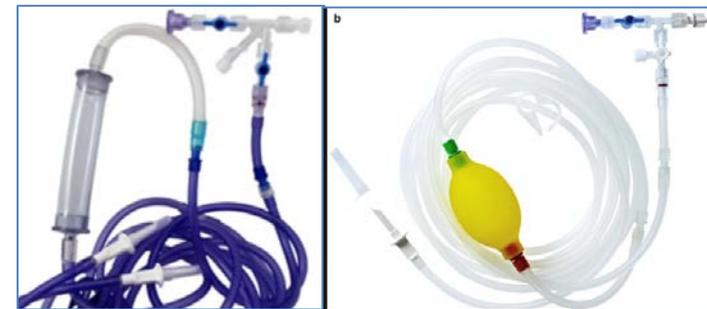
In Vitro Comparison of Maximum Pressure Developed by Irrigation Systems in a Kidney Model

Silvia Proietti, MD, FEBU,^{1,2} Laurian Dragos, MD,^{2,3} Bhaskar Somani, MD, MRCS, FEBU, FRCS,⁴ Salvatore Buttice, MD,^{2,5} Michele Talso, MD,^{2,6} Esteban Emiliani, MD,^{2,7} Mohamed Baghdadi, MD,² Guido Giusti, MD,¹ and Olivier Traxer, MD, PhD⁸; on behalf of Petra Group

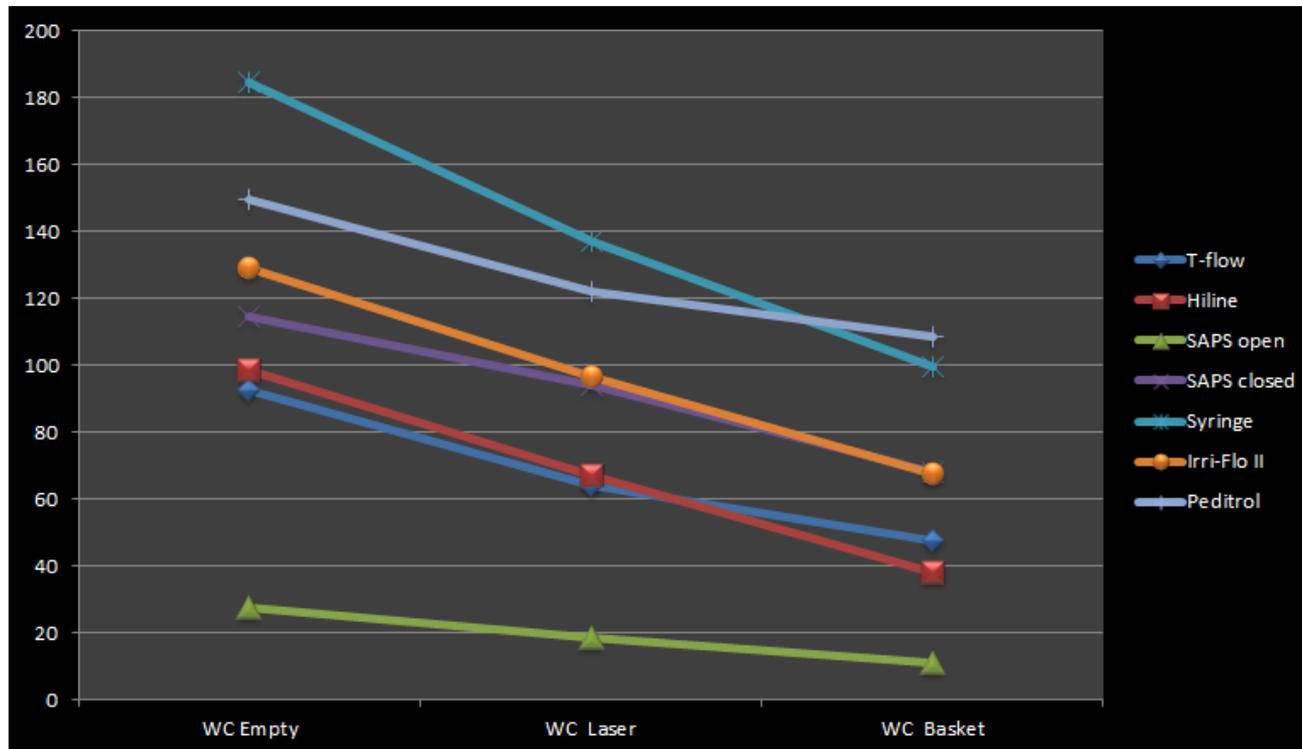
In vitro evaluation of the maximum pressure generated when people of different strenghts used various irrigation systems



15 people divided in 3 groups based on their strenghts



Overall maximum pressure (cmH2O) developed by using the different irrigation systems with WC empty, with laser & basket in



| | WC Empty | WC with Laser | WC with Basket | p value |
|--------------------|--------------|---------------|----------------|---------|
| T-flow | 92.4 ± 20.1 | 64.3 ± 15.1 | 47.8 ± 12.6 | <0.0001 |
| Hiline | 98.4 ± 30.1 | 66.9 ± 25.5 | 38.2 ± 14.6 | <0.0001 |
| SAPS open | 27.7 ± 4.5 | 18.5 ± 11.2 | 11.2 ± 2.6 | <0.0001 |
| SAPS closed | 114.4 ± 26.1 | 94.1 ± 23.2 | 68.3 ± 17.2 | <0.0001 |
| Syringe | 184.7 ± 60.3 | 136.9 ± 48.2 | 99.4 ± 35.7 | <0.0001 |
| Irri-Flo II | 129.3 ± 22.8 | 96.7 ± 12.7 | 67.7 ± 20.4 | <0.0001 |
| Peditrol | 149.7 ± 53.8 | 122.3 ± 21.7 | 108.7 ± 27.6 | <0.0001 |
| p value | <0.0001 | <0.0001 | <0.0001 | |

Group stratification of maximum pressure (cmH2O) developed by using the different irrigation systems

| | Group | WC Empty | WC with Laser | WC with Basket | p value |
|----------------------|---------|-------------------|-------------------|-------------------|-------------------|
| T-flow | 1 | 78.0 ± 13.4 | 53.0 ± 6.8 | 43.8 ± 16.4 | 0.0131 |
| | 2 | 98.4 ± 26.3 | 66.4 ± 20.0 | 48.8 ± 12.1 | 0.0020 |
| | 3 | 100.8 ± 12.4 | 72.4 ± 9.2 | 50.8 ± 10.6 | <0.0001 |
| | p value | 0.14 | 0.08 | 0.70 | |
| Hiline | 1 | 70.6 ± 22.4 | 45.6 ± 16.6 | 25.6 ± 8.2 | 0.0075 |
| | 2 | 104.8 ± 27.3 | 67.4 ± 24.8 | 37.4 ± 12.3 | 0.0006 |
| | 3 | 119.8 ± 18.1 | 87.8 ± 16.3 | 51.6 ± 10.3 | <0.0001 |
| | p value | 0.0152 | 0.0175 | 0.0068 | |
| SAPS open | 1 | 24.4 ± 5.3 | 15.4 ± 4.3 | 9.8 ± 3.5 | 0.0008 |
| | 2 | 28.6 ± 2.5 | 18.8 ± 0.8 | 11.0 ± 1.6 | <0.0001 |
| | 3 | 30.0 ± 3.7 | 21.2 ± 1.6 | 12.8 ± 1.9 | <0.0001 |
| | p value | 0.1115 | 0.0178 | 0.1981 | |
| SAPS close | 1 | 85.4 ± 17.6 | 74.6 ± 14.9 | 52.0 ± 5.3 | 0.0202 |
| | 2 | 120.4 ± 11.4 | 88.4 ± 13.1 | 62.8 ± 4.3 | <0.0001 |
| | 3 | 137.4 ± 13.8 | 119.2 ± 13.7 | 90.2 ± 5.0 | 0.0060 |
| | p value | 0.0003 | 0.0009 | <0.0001 | |
| 60-ml Syringe | 1 | 122.8 ± 27.8 | 86.0 ± 25.3 | 63.8 ± 6.2 | 0.0005 |
| | 2 | 203.8 ± 50.0 | 147.8 ± 21.4 | 100.2 ± 20.3 | 0.0040 |
| | 3 | 227.4 ± 44.0 | 176.8 ± 40.5 | 134.2 ± 30.3 | 0.0106 |
| | p value | 0.0047 | 0.0015 | 0.0008 | |
| Irri-flo II | 1 | 111.6 ± 17.9 | 90.4 ± 9.7 | 51.0 ± 6.0 | 0.0029 |
| | 2 | 131.0 ± 17.9 | 95.2 ± 14.4 | 71.2 ± 14.9 | 0.0002 |
| | 3 | 145.4 ± 21.5 | 104.6 ± 11.5 | 80.8 ± 25.0 | 0.0003 |
| | p value | 0.0488 | 0.2075 | 0.0484 | |
| Peditrol | 1 | 130.8 ± 42.6 | 102.6 ± 11.3 | 85.6 ± 18.4 | 0.1856 |
| | 2 | 156.4 ± 63.6 | 138.8 ± 24.6 | 134.6 ± 27.5 | 0.4084 |
| | 3 | 161.8 ± 59.8 | 125.6 ± 8.8 | 106.0 ± 7.7 | 0.1323 |
| | p value | 0.6567 | 0.0140 | 0.0065 | |
| p value | 1 | 0.0083 | <0.0001 | <0.0001 | |
| | 2 | <0.0001 | <0.0001 | <0.0001 | |
| | 3 | <0.0001 | <0.0001 | <0.0001 | |

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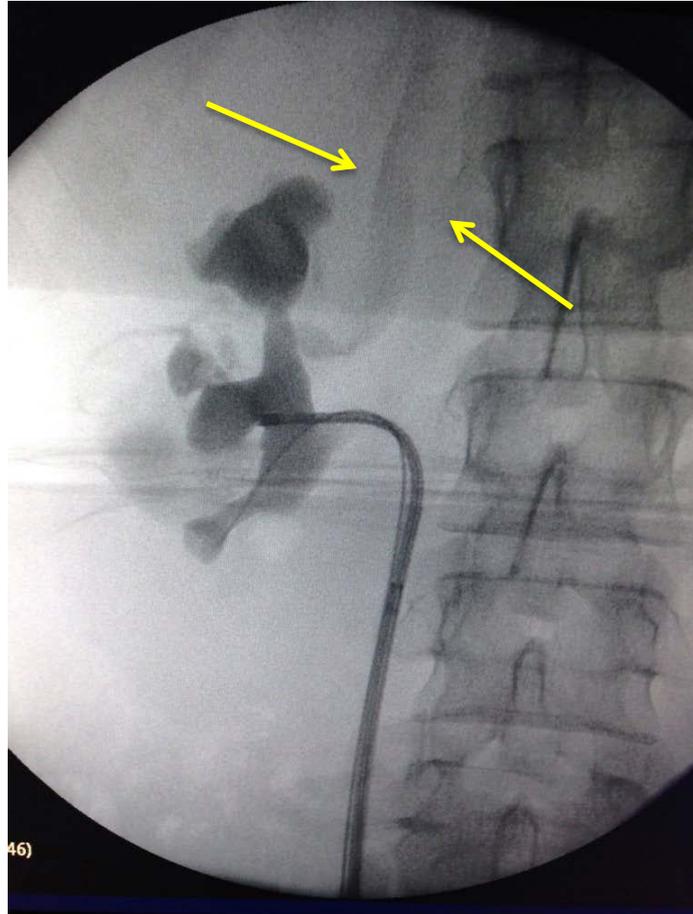
- **be aware of which irrigation system we are using** and the potential intrarenal pressure that may be developed by applying excessive force
- **take into consideration the physical strength of the assistant** or user who is helping or assisting with these devices
- **the simple innocuous and ‘so called’ safe syringe device can generate the highest pressure in all situations**

Irrigation: how much do we need to force?



We need a real-time and continuous measurement of the intrarenal pressure in order to balance the irrigation with visibility and pressure

Irrigation & complications: infective complications



High intrarenal pressure could result in pyelorenal backflow
with potential risk of infective complications

(Schwalb, J Urol 1993; Wilson, J Endourol 1990; Loftus, J Endourol 2018)

Irrigation & complications: infective complications



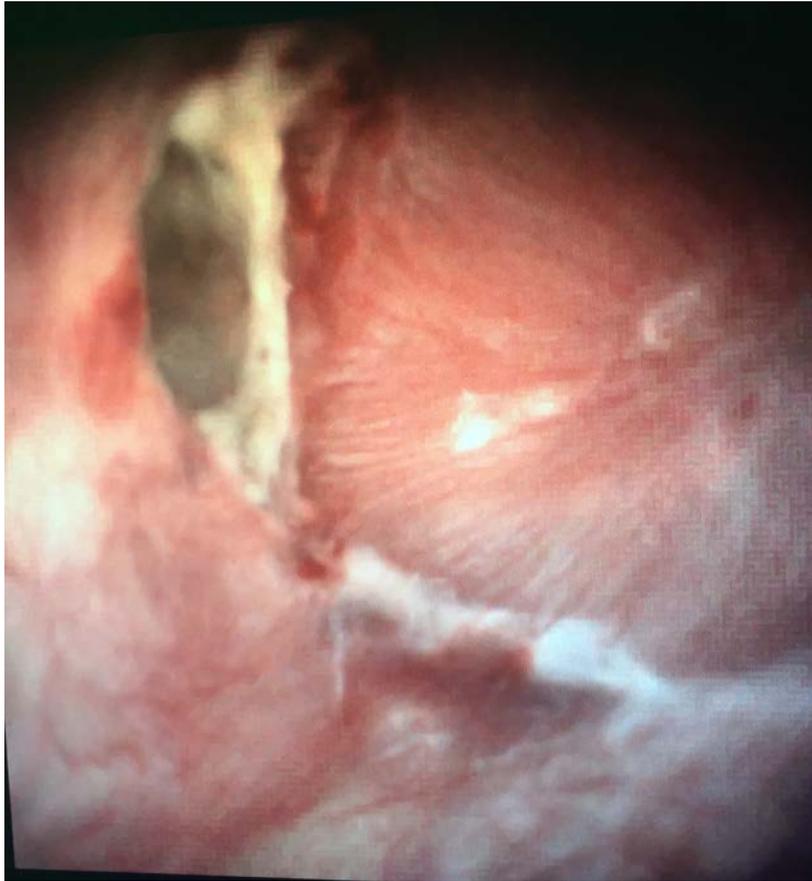
UAS: LOWER INTRARENAL PRESSURE! (Auge et al., J Endourol 2004)

Differences in renal stone treatment and outcomes for patients treated either with or without the support of a ureteral access sheath: The Clinical Research Office of the Endourological Society Ureteroscopy Global Study

Olivier Traxer¹ · Gunnar Wendt-Nordahl² · Hiren Sodha³ · Jens Rassweiler⁴ · Shimon Meretyk⁵ · Ahmet Tefekli⁶ · Fernando Coz⁷ · Jean J. de la Rosette⁸

Conclusions The study showed no difference in SFR when a UAS was used or not. Whereas UAS did not increase the risk of ureteral damage or bleeding, postoperative infectious complications were reduced.

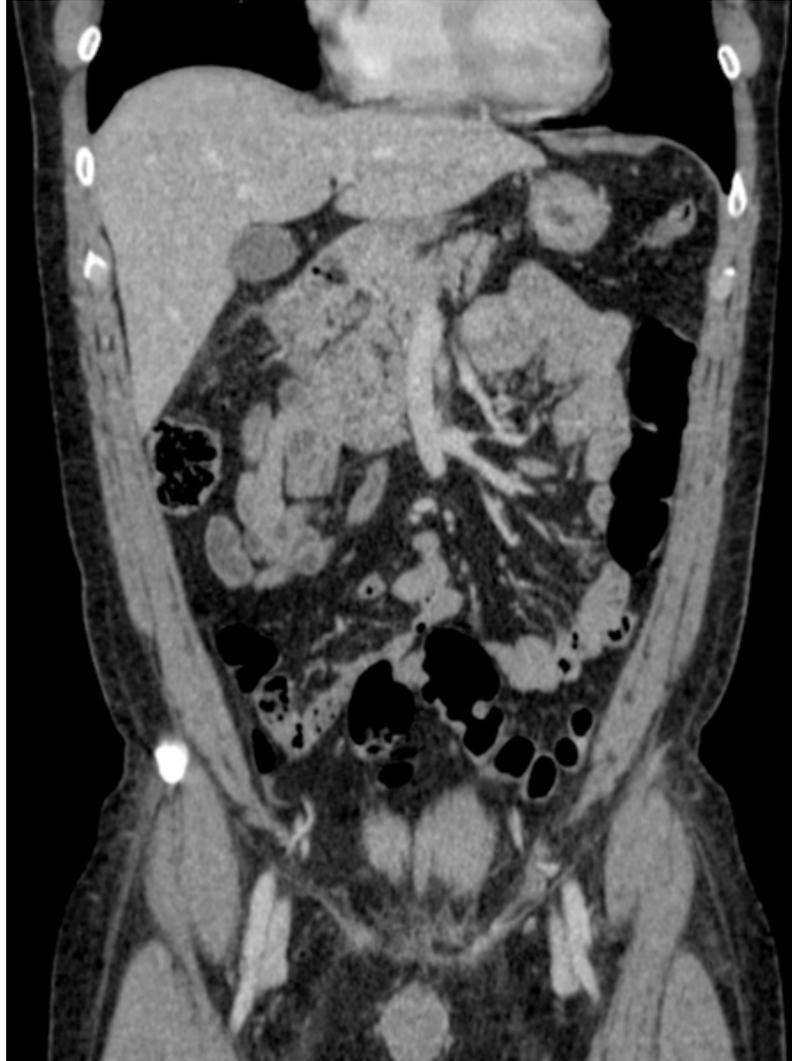
Irrigation & complications: fornix rupture and urinoma



The fornix is susceptible to ruptures during raised intrarenal pressure

(Thomsen HS, Acta Radiol Diagn 1982)

Irrigation & complications: fornix rupture and urinoma



Irrigation & complications: hematoma



Whitehurst & Somani, J Endourol 2017

Irrigation & complications



Intraluminal renal pelvic pressure depends on:

- tension in the pelvic wall
- compliance of the UPJ
- external pressures exerted by surrounding structures

(Djurhuus JC 1980)

Now...

I am really lucky
to have this so
weak assistant

SILVIA, PLEASE DO NOT
WASH TOO MUCH!



Thank you for your attention!



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